Sheet of insulating material, in particular a mineral-fibre felt, comprising an affixed facing, and process for its manufacture.

Patent Number:	☐ EP0067088, B1
Publication date:	1982-12-15
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Requested Patent:	☐ DE3118597
Application	EP19820400870 19820511
Priority Number(s):	DE19813118597 19810511
IPC Classification:	E04B1/94; E04D13/16; E04B1/76; B32B19/06
EC Classification:	B32B19/04, E04B1/76, E04B1/76E, E04B1/78
Equivalents:	☐ DK209082, ☐ ES272843U, FI821634, NO821497
Cited Documents:	US3140220; FR2136113; DE7830852U; US3307306; DE7920480U

Abstract

1. Sheet of insulating material, in particular of mineral fibre felt, comprising a facing which is glued to it as a barrier layer (2) and means for fixing the sheet to elements which form the boundaries to the edges, such as roof rafters, between which the layer of insulating material (1) may be installed under lateral pressure, at least one cut (7 or 8) being made by the manufacturer in the region of the lateral edge of the layer of insulating material in a direction parallel to said edge and without cutting into the facing, so as to form a modular edge strip (4 or 5) which can easily be removed to facilitate adapting the width of the layer of insulating material (1) to the particular requirements of the installation, characterised in that the cut (7 or 8) passes through the whole height of the layer of insulating material (1), the cut surfaces of the cut (7 or 8) are juxtaposed against one another, and the layer of adhesive (9) between the sheet of facing (2) and the layer of insulating material (1) is also provided on the edge strip (4 or 5) which is separated by the cut.

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(19) FEDERAL REPUBLIC OF GERMANY

GERMAN PATENT OFFICE

(12) **Offenlegungsschrift***
[* published, non-examined patent application]

(11) **DE 31 18 597 A1**

(51) Int. Cl.^{3}: **C 04 B 43/02**

(21) Reference No.: P 31 18 597.5

(22) Application Date: May 11, 1981

(43) Date Laid Open to Public Inspection: November 25, 1982

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(54) SHEET OF INSULATING MATERIAL, IN PARTICULAR OF A MINERAL FIBER FELT, WITH AN AFFIXED FACING, AND PROCESS FOR ITS MANUFACTURE

A sheet of insulating material consists of a layer of insulating material (1), in particular of a mineral fiber felt and a sheet of facing (2) fixed thereto by means of a layer of adhesive (3). In the operation of the continuous production of the sheet of insulating material, continuous cuts are provided in the layer of insulating material (1) over its entire height before the application of the sheet of facing (2), which separate the edge strips (4, 5) from the middle area (6) of the layer of insulating material (1). Then, the edge strips (4, 5) are again placed at the middle area (6), followed by the facing, in which case the layer of adhesive (9) also covers and secures in position the edge strips (4, 5). A sheet of insulating material is formed that has lateral modular edge strips (4, 5) of a predetermined, desired width, which [edge strips] can be lifted off and removed from the sheet of facing (2), if necessary, without cutting. If a removal of edge strips (4, 5) is not necessary, the sheet of insulating material behaves, however, like a sheet of insulating material without cuts (7, 8), so that the preparation of modular edge strips (4, 5) has no disadvantageous functional consequences and, moreover, is also problem-free in terms of manufacture and requires only minimal additional expense.

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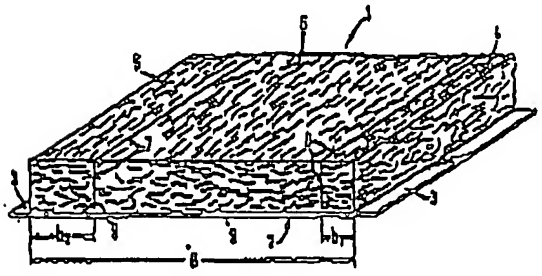

P 731 DE

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SHEET OF INSULATING MATERIAL, IN PARTICULAR OF A MINERAL FIBER FELT, WITH AN AFFIXED FACING, AND PROCESS FOR ITS MANUFACTURE

Patent Claims

1. Sheet of insulating material, in particular of a mineral fiber felt, with an affixed facing as a barrier layer and for fixing the sheet of insulating material to edge boundaries, such as roof rafters, between which the layer of insulating material can be installed under lateral pressure, with at least one being made by the manufacturer in the area of the lateral edge of the layer of insulating material in a direction parallel to said edge and without cutting into the facing for forming a modular edge strip which can easily be removed for adapting the width of the layer of insulating material to the particular requirements of the installation, characterized in that the said cut (7 or 8) passes through the entire height of the layer of insulating material (1), that the cut surfaces of the cut (7 or 8) are juxtaposed against one another, and that the layer of adhesive (9) between the sheet of facing (2) and the layer of insulating material (1) is also provided on the edge strip (4 or 5) which is separated by the cut (7 or 8).

2. Sheet of insulating material in accordance with claim 1, characterized in that said edge strip (4, 5) formed by the said bilateral cuts (7, 8) have said different modular widths (b_1, b_2) in both edge areas of the said layer of insulating material (1).

3. Sheet of insulating material in accordance with claim 2, with a layer of insulating material of mineral fiber felt, characterized in that the said width (b_1) of the one said edge strip (4) is ca. 50 mm and the said width (b_2) of the other side edge strip (5) is ca. 100 mm.

4. Process for the manufacture of a sheet of insulating material in accordance with at least one of the claims 1 through 3, in which a layer of insulating material is continuously produced at first and is then provided with a sheet of facing, characterized in that the cut is continuously made in the said layer of insulating material at the provided site of the edge area of the layer of insulating material before placement of the facing by means of complete separation of the associated edge strip, and the said separated edge strip is again placed at the middle area of the layer of insulating material with a complete closure of the cut surfaces of the cut before the sheet of facing is applied.

5. Process in accordance with claim 4, in which the continuously produced layer of insulating material made of a mineral fiber felt is trimmed and is optionally cut into partial sheets of a desired nominal width, characterized in that the cut is made during the trimming and/or the cutting of the sheet-type layer of insulating material.

6. Process in accordance with claim 4 or 5, characterized in that the cut is made by means of a high-pressure water jet.

7. Process in accordance with one of the claims 4 through 6, characterized in that the separated edge strips are pressed by means of slanted guiding plates, which act on the said edge strips between the cutting point and the facing point.

Specification

The present invention pertains to a sheet of insulating material, in particular of a mineral fiber felt, with an affixed facing, according to the preamble of claim 1, as well as a process for its production.

Such sheets of insulating material are well known in many different embodiments. For example, a sheet of insulating material, which has a layer of insulating material made of bound glass wool and is provided with an aluminum foil facing, has found very wide distribution. The aluminum foil acts, on the one hand, as a vapor barrier and, on the other hand, is used for fixing the sheet of insulating material, for example, between roof rafters, to which edge strips projecting laterally over the layer of insulating material can be nailed to the inner front surface of the roof rafter.

One problem in this connection is that the sheets of insulating material are generally produced and delivered only in specific nominal widths of, e.g., 500, 600, 700, 800, and 1,000 mm; however, the width between the edge boundaries, e.g., roof rafters, fluctuates and has intermediate values. Such sheets of insulating material must therefore frequently be cut at the site of installation to the needs of the particular installation, which is relatively labor-intensive, since a lateral edge strip of the layer of insulating material must be cut off manually on the sheet of insulating material prepared with an excess width. In practice, this additional work is, of course, avoided as much as possible, with the consequence that the sheet of insulating material is installed with an excess of, e.g., 80 mm or even more, instead of with the ideal excess of ca. 20 mm or even an excess of ca. 50 mm, which can still be tolerated. However, such inaccurately installed sheets of insulating material cannot perform their function efficiently, since thermal bridges may appear, the edge strips of the facing become warped, bent over or crushed, such that they no longer seal hermetically; thus, all in all, such an improper installation must be classified as a clear fault in construction.

A sheet of insulating material of this class, in whose edge areas are provided relatively wide cuts at distances of, e.g., 10 mm, that define corresponding ribs of insulating material between the cuts, has become known from DE-GbmS 78 30 852. The cuts pass through one part of the height of the layer of insulating material, and the facing forming the vapor barrier is not affixed in the area of the cuts, but rather loosely covers the layer of insulating material, without being connected to each other. As a result, it is possible to lift off the facing from the edge area and to break off an edge strip at a [sic] suitable cut of the layer of insulating material, so that this receives the desired width.

It is a drawback herein that the large number of relatively wide, groove-like cuts inevitably reduces the heat insulation power of the said layer of insulating material in these edge areas, which is more noticeable, the fewer of the lateral ribs of insulating material must be broken off for the particular installation; all groove-like cuts are retained for the case of a width of layer of insulating material that actually fits and correspondingly sharply reduce the heat insulation power in the edge areas of the layer of insulating material. Furthermore, the ribs of insulating material between the cuts may also be inadvertently easily damaged or even be broken off, since they are connected to each other only via a thin bridge of the heat insulation material by reason of the cuts. Finally, the groove-like cuts must obviously be made in the layer of insulating material by means of corresponding sawing or milling cutters, i.e., by means of a waste-intensive processing, which leads, on the one hand, to relatively high losses of material, and, on the other hand, requires additional effort for the disposal of the waste material. All the more so, as the groove-like cuts have relatively large widths, in order to achieve a sufficient elasticity reserve for an edge compression even in case of less compressible materials, such as high-resistance foam.

In contrast, the basic object of the present invention is to create a sheet of insulating material of the type outlined in the preamble of claim 1, as well as a process for its manufacture, which, insofar as the modular edge strips produced here do not have to be removed for the installation, do not have any functional differences compared to a sheet of insulating material without cuts, and which, seen under aspects of process engineering, requires as little as possible additional effort in manufacture compared to a sheet of insulating material without cuts.

This object is accomplished, in terms of means engineering, by the characterizing features of claim 1 and, in terms of process engineering, by the characterizing features of claim 4.

As a result of each cut passing through the entire height of the layer of insulating material, it [cut] is made during the manufacture of the layer of insulating material before its facing without difficulties by means of a simple full cut of the insulating material. As a result of the sheet of facing also being provided with a layer of adhesive in the area of the edge strip cut in this manner, the edge strips, as well as the uncut middle area of the layer of insulating material are held perfectly on the facing and are protected by same. As a result of the cut surfaces being juxtaposed against one another, first of all there are no differences to a sheet of insulating material without any cuts either in appearance or in the heat insulation power of such a sheet of insulating material, since the cut is largely invisible and functionally does not become evident.

Moreover, the circumstance may be utilized that the cut surfaces of the layer of insulating material guided against one another again optionally under lateral pressure after the cut adhere to each other, e.g., by means of interconnecting or clinging to one another. Thus, each edge strip adheres both on the side of the facing via the layer of adhesive there and to the cut surfaces by means of an action of adhering to one another, such that the cut does not gape even with the usual handling of the sheet of insulating material. Only if the layer of insulating material is exposed to a certain bending in the area of the cut, the adhesion breaks up and the cut gapes, after which the edge strip can be removed from the facing manually or with a knife or the like, without a cutting operation being required.

The number of cuts in each edge area depends on the permissible range of the excess in case of the installation, on the one hand, and on the gradations of the nominal width of the sheets of insulating material, on the other hand. Thus, a different modular or separation dimension may be used for the modular width of the edge strips in both edge areas of the sheet of insulating material to achieve a suitable number of intermediate widths. In case of a layer of insulating material based on a mineral wool or the like, which is relatively readily compressible, a modular width of an edge strip usually reaches 50 mm, if the gradation lies within the nominal widths at 100 mm, since a compression in the direction of the width of 50 mm during installation can be absorbed by the material. An edge strip of 50 mm is particularly preferably produced on one side and one of 100 mm on the other side, so that the width of the layer of insulating material can be reduced by 50, 100 and 150 mm without cutting and therefore the gradations between successive nominal widths can be increased to 200 mm which means considerable advantages for production in terms of storage because of a lower variety of types.

The cuts can be made during the normal manufacture of the sheet of insulating material very simply by additional cutters, which, together with other cutters, can work to produce partial sheets, to trim or the like. After the cut area, the cut-off edge strip can be replaced very simply by means of lateral guide plates or the like, so that there is no evident disturbance at all in the work process during the manufacture due to the making of the cuts.

Making cuts in such sheets of insulating material, which pass through the entire height of the layer of insulating material, has become known from US-PS 39 64 232. However, these cuts are guided through the sheet of facing as well and are not used to produce removable, modular edge strips, but rather to produce perforated cuts transversely to the longitudinal extension of the sheet of insulating material, in order to be able to simply tear off lengthwise sections of the sheet of insulating material at these desired tear points. Similarly, according to GbmS 79 20 480 such perforating cuts are made in a mineral fiber board of a high bulk density, in order to be able to break off defined pieces from the board by means of these perforations and to use them separately.

Further details, features and advantages of the invention shall become evident from the following description of an embodiment based on the drawing.

The sole figure of the drawing shows a perspective view of a section of sheet of insulating material provided with a facing according to the present invention.

The sheet of insulating material illustrated in the drawing has a layer of insulating material 1 and a sheet of facing 2 affixed on one side of the layer of insulating material 1. The sheet of facing 2 may be, e.g., kraft paper; however, a metal foil, such as an aluminum foil, is preferred, optionally with a reinforcing layer, as this has become known from DE-AS 30 13 223, to which reference is made in this respect because of other details. The layer of insulating material 1 may basically consist of any suitable insulating material, whereby insulating materials having a relatively high compressibility, in particular mineral fiber felt or mineral wool, are preferred, however.

In the position illustrated, the sheet of insulating material is put on adjacent roof rafters from below in such a manner that the sheet of facing 2 with overlapping lateral edge strips 3 comes to lie on the inner front surface of the roof rafters and can be fixed there by tamping or the like, while the layer of insulating material 1 comes to lie pressed between the lateral surfaces of the roof rafters. In this case, before installation, i.e., in the position shown, the layer of insulating material has a width B, which should be ca. 20 to 50 mm greater than the clear distance between the adjacent roof rafters or other edge boundaries, to obtain the desired lateral application pressure under slight compression of the layer of insulating material 1 in the direction of the width B.

As is easily comprehensible, such sheets of insulating material can only be manufactured in certain, distinct, nominal widths, e.g., with gradations of 100 mm between 500 and 1,000 mm, and such a small gradation in the nominal widths that would lead to a width that still fits for each application would result in high manufacturing and storage expenses. To achieve an adaptation to installation widths lying between the nominal widths without having to cut the layer of insulating material 1 to the desired width B, the layer of insulating material 1 is provided with edge strips 4 and 5, which are separated from the middle area 6 of the layer of insulating material 1 by means of cuts 7 and 8. These modular edge strips 4 and 5 may, if necessary, be selectively removed, as this is explained in detail further below, to reduce the installation width of the layer of insulating material 1 without any cutting to a dimension which does not result in any increased compression of the layer of insulating material 1 with the given distance of the roof rafters or the like.

A layer of adhesive 9 provided between the sheet of facing 2 and the layer of insulating material 1 passes through the entire width of the layer of insulating material 1, including the edge strips 4 and 5, so that these are also held on the sheet of facing 2. Of course, the layer of adhesive 9 does not need to be applied to the full area, but rather may also be applied, e.g., in individual, distinct strips; however, it is fundamental that the corresponding adhesive action is also present on the edge strips 4 and 5. Furthermore, the cuts 7 and 8 have a closed design, in such a manner that the edge strips 4

and 5 are adjacent to the middle area 6 of the layer of insulating material with no gap. The material of the layer of insulating material 1 is thus mutually placed in the cuts 7 and 8, which brings about a certain adhesion in the cut surface area due to a type of clinging, so that the edge strips 4 and 5 do not easily gape in case of an unfavorable support of the sheet of insulating material. If it is decided, however, that, e.g., the edge strip 4 should be removed, then the sheet of facing 2 in the area of the cut 8 can be manually specifically bent in such a manner that the layer of insulating material gapes there when the adhesion action of the material in the cut 8 is neutralized. It is then possible to enter between the edge strip 4 and the adjacent side of the sheet of facing 2 manually or even by means of a two-dimensional tool, e.g., a knife, a trowel or the like, and the edge strip 4 can be removed from the sheet of facing 2. The layer of insulating material 1 is then present in a correspondingly reduced width, while the associated edge strip 3 is correspondingly widened, if it was not already provided during the facing procedure in a state rotated by 180°. Depending on the local conditions, the edge strips 3 can be either left in the retracted state or be swung out laterally.

By way of example, a mineral fiber felt, e.g., glass wool, may be used to form the layer of insulating material 1. In such a case, it proved to be expedient to design one of the edge strips 4 or 5, e.g., the edge strip 4, in a width b_1 of 50 mm, and to provide the edge strip 5 lying on the opposite side with a width b_2 of 100 mm. As a result of this, the nominal width can be reduced in degrees of 50 mm to a maximum of 150 mm. In this way, a gradation of 200 mm between the nominal widths B of the individual, premanufactured sheets of insulating material can be preset, and even so, a gradation by 50 mm in each case is available at the installation site by removing the corresponding edge strip 4 or 5. A gradation of 50 mm proved to be sufficient in the case of mineral fiber felt, since the layer of insulating material 1 can be laterally compressed by up to somewhat more than 50 mm without functional drawbacks. Because of discontinuation of corresponding intermediate nominal widths, the preparation of a sheet of insulating material with a nominal width which is above the desired dimension needed is necessary in certain cases; however, a labor-intensive cutting of the sheets of insulating material for this is avoided, and the result is a reduction in cost, in particular with regard to the storage, due to the lower number of nominal widths. Moreover, the removed edge strips may advantageously be used for the mending insulations that may occur during insulation work.

Of course, a plurality of cuts 7 or 8 at modular distances of, e.g., 25 mm from one another may also be provided in each edge area of the layer of insulating material 1 in order to optionally achieve the desired intermediate widths depending on the compressibility of the material of the said layer of insulating material 1.

The additional effort in the manufacture of the sheet of insulating material for making the cuts 7 and 8 may conceivably be kept low, since the separation to form the cuts 7 and 8 takes place at the same time as the making of partial sheets and then the edge strips can again be immediately placed at the middle area 6, e.g., by means of lateral guide plates. A final mutual securing in position of the edge strips 4 and 5 and of the middle area 6 then takes place at the site of the facing, where the sheet of facing 2 coated with the layer of adhesive 9 is placed on the layer of insulating material 1 and all the individual strips are secured by the adhesion. In the case of a layer of insulating material 1 made of glass wool or the like, a high pressure water jet is used to make the cuts 7 or 8, which additionally leads to a certain moistening of the cut surfaces and thus improves the adhesion to one another after the replacing. In the case of mineral wool, this adhesion takes place by means of a type of clinging to one another of the mineral fibers in the area of the cut point. The additional effort can be kept very low, since already corresponding cutters, such as water jet nozzles or saws, are necessary for the trimming of the sheet-type layer of mineral fibers on the production belt, as well as optionally for their division into sheets of the desired nominal width, so that only, e.g., a few additional water nozzles must be installed for making the cuts 7 and 8 in the trimming or separating cut unit, while

the edge strips 4 and 5 can be replaced again quite simply by means of corresponding guide plates on the outer edge of the formed sheets.

Since the cuts 7 and 8 are immediately completely closed again after they are made, they are hardly visible on the finished product and also do not become evident, especially in terms of function, e.g., because of a drop in heat insulation action or the like. As for the handling of the sheets of insulating material during the assembly, there are no fundamental differences to the handling of the sheets of insulating material without cuts, even though the additional possibility was created of being able to simply and quickly remove a selective edge strip 4 or 5.

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No.: 31 18 597
Int. Cl.[3]: C 04 B 43/02
Application Date: May 11, 1981
Date Laid Open to Public Inspection: November 25, 1982

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